

What is claimed:

1. A method for inspecting foreign matters in or on repeated micro-miniature patterns formed upon a surface of an object to be inspected, comprising the following steps:

5 illuminating an inspection light directed upon the surface of the object to be inspected, on which the repeated micro-miniature patterns are formed, with an inspection light illuminating device;

 detecting scattered light of the inspection light being scattered from the surface of said object to be inspected with at
10 least a scattered light detector;

 determining a coordinate position of a foreign matter upon the surface of said object to be inspected, on a basis of the detection of said scattered light in the above step;

 picking up an image of said foreign matter whose coordinate
15 position is determined in the above step, under a bright field illumination by an illuminating means, at a coordinate position which is corresponding to that in said scattered light detecting step; and

 deciding said foreign matter at least one of in size, shape, color and property thereof, depending upon an image of said foreign
20 matter which is extracted on a basis of said the image picked up in the above step.

2. A method for inspecting foreign matters in or on repeated micro-miniature patterns, as defined in claim 1, further comprising a step of picking up an image of an another position of said repeated
25 micro-miniature patterns of said object to be inspected, at a position corresponding to the coordinate position of said foreign matter which is determined by said detecting of the scattered light, under a bright field illumination by said illumination means, whereby the foreign matter image in said deciding step is extracted by

comparing both said picked up images.

3. A method for inspecting foreign matters in or on repeated micro-miniature patterns, as defined in claim 1, further comprising a step of verifying appropriateness with respect to the determination
5 made in said determining step of the coordinate position of said foreign matter upon the detecting of the scattered light, on a basis of the decision made on said foreign matter appearing in the image which is picked up in said picking up step.

4. A method for inspecting foreign matters in or on repeated
10 micro-miniature patterns, as defined in claim 1, wherein the shape is determined in said deciding step, by use of the sizes of the image of said foreign matter which is obtained in said picking up step thereof.

5. A method for inspecting foreign matters in or on repeated
15 micro-miniature patterns, as defined in claim 1, wherein the color is determined in said deciding step, by use of a color component and a gradation of the image of said foreign matter which is obtained in said picking up step thereof.

6. A method for inspecting foreign matters in or on repeated
20 micro-miniature patterns, as defined in claim 1, wherein the property is determined in said deciding step, further by use of the scattered light from said detected foreign matter, which is detected with said scattered light detector.

7. An apparatus for inspecting foreign matters in or on
25 repeated micro-miniature patterns formed upon a surface of an object to be inspected, comprising:

a light illuminating device for illuminating an inspection light directed upon the surface of the object to be inspected, on which the repeated micro-miniature patterns are formed;

a scattered light detector for detecting the scattered light of the inspection light being scattered from the surface said object to be inspected;

means for determining a coordinate position of a foreign
5 matter upon the surface of said object to be inspected, on a basis of the detection of said scattered light;

an illumination means for applying a bright field illumination upon the surface of the object to be inspected, on which the repeated micro-miniature patterns are formed;

10 means for picking up an image of the foreign matter which is determined with the coordinate position thereof, under a bright field illumination by said illumination means, at the coordinate position corresponding to that which is determined by said coordinate position determining means; and

15 means for deciding the foreign matter at least one of in size, shape, color and property thereof, depending upon an image of the foreign matter which is extracted on a basis of said picking up of the image obtained by said image picking up means.

20 8. An apparatus for inspecting foreign matters, as defined in claim 7, wherein said image picking up means and said scattered light detecting means are constructed for a common use thereof.

9. An apparatus for inspecting foreign matters, as defined in claim 7, wherein a stage, in which said image picking up means picks up the image under the bright field illumination by said
25 illumination means, is provided separately from a stage in which said scattered light detector detects the scattered light under the inspection light from said light illuminating device.

10. An apparatus for inspecting foreign matters, as defined in claim 7, further including:

means for obtaining a reference image by picking up the image of the micro-miniature pattern, under a bright field illumination, at an another coordinate position on the surface of said object to be inspected, which is corresponding to but different from the coordinate position which is determined by said determining means;
5 and

means for obtaining an arithmetic processed image between said object image and said reference image, wherein said decision means decide a presence of a defect at the determined coordinate position on said object to be inspected, which is previously designated, on
10 a basis of the arithmetic processed image obtained by said arithmetic processed image obtaining means.

11. An apparatus for inspecting foreign matters, as defined in claim 10, wherein said arithmetic processed image obtaining means
15 obtain a difference image processed between said object image and said reference image.

12. An apparatus for inspecting foreign matters, as defined in claim 10, wherein said arithmetic processed image obtaining means obtain an addition image processed between said object image and said
20 reference image.

13. An apparatus for inspecting foreign matters in or on repeated micro-miniature patterns formed upon a surface of an object to be inspected, comprising:

an light illuminating device for illuminating an inspection
25 light directed upon the surface of the object to be inspected, on which the repeated micro-miniature patterns are formed;

a scattered light detector for detecting scattered light of the light being scattered from the surface said object to be inspected;

means for obtaining a first information related to a foreign matter attaching upon the surface of said object to be inspected, which is obtained on a basis of the detection of said scattered light by said scattered light detector;

5 an illumination means for applying a bright field illumination upon the surface of the object to be inspected, on which the repeated micro-miniature patterns are formed;

means for picking up the image of the foreign matter, under a bright field illumination by said illumination means;

10 means for obtaining a second information related to said foreign matter, depending upon an image of said foreign matter, which is obtained on a basis of said picking up of the image by said image picking up means under the bright field illumination; and

means for displaying said first information and said second
15 information, both being related to said foreign matter, on a display screen thereof.

14. A method for inspecting foreign matters in or on repeated micro-miniature patterns formed upon a surface of an object to be inspected, comprising following steps:

20 obtaining an object image by picking up the image of the micro-miniature pattern, under a bright field illumination, at a coordinate position on the surface of said object to be inspected, which is designated previously;

obtaining a reference image by picking up the image of the
25 micro-miniature pattern, under a bright field illumination, at an another coordinate position on the surface of said object to be inspected, which is different from but corresponding to said coordinate position mentioned in the above step;

obtaining an arithmetic processed image between said object

image and said reference image; and

deciding a presence of a foreign matter at the coordinate position on said object to be inspected, which is previously designated, on a basis of a condition of said arithmetic processed
5 image obtained in the above step.

15. A method for inspecting foreign matters, as defined in claim 14, wherein said arithmetic processed image is a difference image between said object image and said reference image.

16. A method for inspecting foreign matters, as defined in
10 claim 14, wherein said arithmetic processed image is an summation image between said object image and said reference image.

17. A method for inspecting foreign matters, as defined in claim 14, wherein the coordinate position on the surface of said object to be inspected which is designated previously, is a position
15 of existing said foreign matter, which is defined by detecting a scattered light from the surface of the repeated micro-miniature pattern under a dark field when an inspection light is illuminated upon said object to be inspected from a light source.

18. A method for inspecting foreign matters, as defined in
20 claim 14, wherein on the surface of said object to be inspected are formed at least two or more of same patterns repeatedly, and the position of said reference image is equal to that of said object image to inspected on the coordinates on each of said at least two or more of patterns.

25 19. A method for inspecting foreign matters, as defined in claim 15, wherein said deciding process decides a defect when said difference image obtained is divided into at least two or more images.

20. A method for inspecting foreign matter, as defined in claim 16, wherein said deciding process compares said summation image to

a predetermined value to decide a defect when at least two or more images are obtained as a result of the above comparison.